

Waves Equations Worksheet

Level: GCSE / A-Level | Difficulty: Intermediate | Topic: Waves & Optics

Practice the wave equations with 10 problems covering wave speed, frequency, period, and wavelength. Includes full worked answers.

Equations you will need

$v = f\lambda$	Wave speed = frequency x wavelength
$T = 1/f$	Period = 1 / frequency
$f = 1/T$	Frequency = 1 / period

Symbol key

Symbol	Quantity	Unit
v	wave speed	m/s
f	frequency	Hz (hertz)
λ	wavelength	m
T	period	s

Practice problems

1. A wave has frequency 50 Hz and wavelength 4 m. Find its speed.
2. A sound wave travels at 340 m/s with wavelength 2 m. Find the frequency.
3. Find the period of a 25 Hz wave.
4. A water wave has a period of 0.5 s and wavelength 1.2 m. Find its speed.
5. Radio waves travel at 3×10^8 m/s. Find the wavelength of a 100 MHz station.
6. A wave on a string completes 60 oscillations in 4 s. Find the frequency and period.
7. A wave has speed 300 m/s and period 0.01 s. Find the wavelength.
8. Visible red light has wavelength 700 nm. Find its frequency. ($c = 3 \times 10^8$ m/s)

9. A wave has frequency 200 Hz and travels 50 m in 0.25 s. Find the wavelength.
10. Two waves: A has period 0.02 s, B has period 0.05 s. Which has higher frequency?

Answer key

Full worked solutions for each problem.

1. $v = \lambda f = 50 \times 4 = 200 \text{ m/s}$
2. $f = v/\lambda = 340/2 = 170 \text{ Hz}$
3. $T = 1/f = 1/25 = 0.04 \text{ s}$
4. $f = 1/0.5 = 2 \text{ Hz}$; $v = 2 \times 1.2 = 2.4 \text{ m/s}$
5. $\lambda = v/f = (3 \times 10^8)/(108) = 3 \text{ m}$
6. $f = 15 \text{ Hz}$; $T = 0.0667 \text{ s}$
7. $f = 100 \text{ Hz}$; $\lambda = 300/100 = 3 \text{ m}$
8. $f = c/\lambda = 3 \times 10^8 / 7 \times 10^7 = 4.29 \times 10^1 \text{ Hz}$
9. $v = 50/0.25 = 200 \text{ m/s}$; $\lambda = 200/200 = 1 \text{ m}$
10. $f_A = 50 \text{ Hz}$; $f_B = 20 \text{ Hz}$; A has higher frequency